UNITED STATES PATENT APPLICATION
FOR

INVENTORY LOCATION COMMON OBJECT

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INVENTORY LOCATION COMMON OBJECT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 60/457,271 filed March 24, 2003, entitled, "INVENTORY LOCATION SYNCHRONIZATION AND COMMON OBJECT," by Kahlon et al., and which is hereby incorporated by reference in its entirety.

TECHNICAL FIELD

[0002] The present invention is directed to the field of data modeling in the context of enterprise resources planning and customer relations management, and more specifically to inventory management.

BACKGROUND

[0003] Manufacturers and suppliers of products use back-office computerized systems to provide support for functions in enterprise resources planning (ERP). Such functions include manufacturing, marketing, inventory control, procurement and financing.

[0004] Also available are front-office computerized systems, which provide support to product vendors and distributors. In the context of inventory management, such front-office functions include analysis of historical customer demand for products, stocking and replenishment of inventory, and providing information resources for delivery of inventory and service to consumers. In order to take advantage of such front-office software computerized systems, their users typically must store data in

forms usable by the front-office computerized system, which often differ significantly from the forms usable with back-office computerized systems.

[0005] Thus, when some or all aspects of inventory are managed by both back-office and front-office computerized systems, there is a need to synchronize the inventory information in both computerized systems. Generally, in order for front-office computerized systems to communicate with back-office computerized systems that are already being used, the user must manually regenerate data from the back-office computerized systems in forms usable by the front-office computerized systems, and vice versa. Such manual regeneration has several significant disadvantages, including: (1) it is often expensive; (2) it often requires a substantial amount of time to complete; (3) it must be repeated each time data changes in either the back-office system or the front-office system; and (4) it is prone to errors.

[0006] In view of the foregoing, an automated approach for transforming data used by a back-office computerized system for use by a front-office computerized system, and vice versa, is needed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1A is a high level network diagram showing aspects of a computerized environment in which the facility operates, according to certain embodiments.

[0008] FIG. 1B is a block diagram that illustrates some business components of target system 130, according to certain embodiments.

[0009] FIG. 2 is a block diagram showing some of the components typically incorporated in at least some of the computer systems and other devices on which the facility executes.

[0010] FIG. 3A is a high level flow diagram that shows some steps performed by the facility.

[0011] FIG. 3B is a flow diagram that illustrates further aspects of data integration operation, according to certain embodiments.

[0012] FIG. 4 to FIG. 16 are data structure diagrams that illustrate the inventory location common object model, according to certain embodiments.

DETAILED DESCRIPTION

[0013] According to certain embodiments, the synchronization of inventory information addresses the needs of a company that deploys multiple computer applications, obtained from multiple vendors of computer applications, in the company's inventory management system. The synchronization operation provides a user of the inventory management system the same view of the inventory information across the various computer applications. All changes in the inventory information need to be captured and made accessible to all relevant computer applications in the inventory management system. For example, when an inventory item is received into inventory, shipped for an order, or has a change in its availability status (such as "reserved" status from "on hand" status), such inventory information need to be captured and made accessible to relevant computer applications in the inventory management system.

[0014] For purposes of explanation, assume that a company's inventory management system includes a front-office system (target system) for customer interfacing operations. Further, assume that the company's inventory management system also includes a back-office system (source system) that includes an inventory cost accounting application, for example. The computer applications of the front-office system uses a data model that is distinct from the data model used in back-office system's computer applications.

[0015] Inventory items are physically stored in a central distribution warehouse, at a field service office, in one or more field service engineer's trunk, or at a third party vendor's location. Assume that the various computer applications associated with inventory management used by the central distribution warehouse, the field service office, the field service engineer, and the third party vendor, are part of the target system. An inventory cost accounting application, for example, from the source system will need to share inventory information with the target system computer applications. Thus, a common data storage model is needed so that the various computer applications across the company's inventory management system can share the inventory information.

[0016] An important piece of information in inventory management is the inventory location information. For example, when a front-office call center receives an order from a customer, the call center needs to access inventory location information that is maintained by the back-office system in order to fill the customer order.

[0017] A software facility (hereafter "the facility") for automatically converting inventory location information, is described. In some embodiments, the facility converts inventory location information from a form used by the source system to a form used by the target system. In certain embodiments, source systems may be back-office systems providing support for such functions as manufacturing, marketing, inventory control, procurement and financing. In certain embodiments, target systems may be front-office system providing support for such functions as analysis of historical customer demand for products, stocking and replenishment of inventory, and providing information resources for delivery of inventory and service to consumers, and sales.

[0018] In some embodiments, such as embodiments adapted to converting inventory location information in the first source format, the facility converts inventory location information by converting the inventory location information that is in the first source format into an intermediate format. The intermediate format is then used to convert the inventory location information into the target format.

[0019] By performing such conversions, embodiments of the facility enable a user of a first computerized system who has stored inventory location information in a first format for use by the first computerized system to readily make the stored inventory location information available for use in a second computerized system that utilizes a second format in a cost-efficient and time-efficient manner.

[0020] FIG. 1A is a network diagram showing aspects of a typical hardware environment in which the facility operates. FIG. 1A shows a source system 110, a

target system 130, an integration server 120 and a network 150. Source system 110 stores inventory location information in a source format. There may be more than one source system. Target system 130 stores inventory location information in a target format. Target system 130 is described in greater detail herein, with reference to FIG. 1B.

[0021] The facility (not shown) converts some or all inventory location information that is in the source format into the target format by using an intermediate format of the inventory location information. In certain embodiments, such conversions are performed with the aid of one or more other computer systems, such as integration server system 120. Components of the facility may reside on and/or execute on any combination of these computer systems, and intermediate results from the conversion may similarly reside on any combination of these computer systems.

[0022] The computer systems shown in FIG. 1A are connected via network 150, which may use a variety of different networking technologies, including wired, guided or line-of-sight optical, and radio frequency networking. In some embodiments, the network includes the public switched telephone network. Network connections established via the network may be fully-persistent, session-based, or intermittent, such as packet-based. While the facility typically operates in an environment such as is shown in FIG. 1A and described above, those skilled in the art will appreciate the facility may also operate in a wide variety of other environments.

[0023] FIG. 2 is a block diagram showing some of the components typically incorporated in at least some of the computer systems and other devices on which the facility executes, including some or all of the server and client computer systems shown in FIG. 1A. These computer systems and devices 200 may include one or more central processing units ("CPUs") 201 for executing computer programs; a computer memory 202 for storing programs and data -- including data structures -- while they are being used; a persistent storage device 203, such as a hard drive, for persistently storing programs and data; a computer-readable media drive 204, such as a CD-ROM drive, for reading programs and data stored on a computer-readable medium; and a network connection 205 for connecting the computer system to other computer systems, such as via the Internet, to exchange programs and/or data -- including data structures. While computer systems configured as described above are typically used to support the operation of the facility, those skilled in the art will appreciate that the facility may be implemented using devices of various types and configurations, and having various components.

[0024] It will be understood by those skilled in the art that the facility may transform inventory location information from a number of different source systems and from a number of different source software packages to a number of target systems and/or to a number of target software packages.

[0025] FIG. 1B is a block diagram that illustrates some business components of target system 130. According to certain embodiments, such business components include a central distributing warehouse 152, a multiplicity of field offices 154, 156,

a plurality of trunks, such as trunk 158, and one or more call centers, such as call center 160. Such business components in target system 130 use and store inventory location data in the target format. Further, one of the primary functions of target system 130 is to serve and interface with customers 162.

[0026] FIG. 3A is a high level flow diagram that shows some steps typically performed by the facility in order to convert inventory location information from the one or more source formats to the target format. At block 301, the facility extracts inventory location information from one or more source systems. At block 302, the facility converts the extracted information into an intermediate format. The intermediate format is described in greater detail herein, with reference to the common object data model. At block 303, the facility synchronizes the inventory location information from the source system with that of the target system by converting the inventory location information in intermediate format into the target format. After block 303, the steps as shown in FIG. 3A conclude.

[0027] The steps shown in FIG. 3A may be repeated periodically, either to convert inventory location information that is changed in the source system since the last conversion, and/or to convert one or more particularly selected inventory location information. The facility may perform conversions from various source systems on which is executing various source software packages, and/or convert inventory location information to various target systems executing different target software packages.

[0028] To further illustrate the process shown in FIG. 3A, an example of such a data conversion operation is discussed below. The data conversion operation will hereafter be referred to as data integration operation. The data integration operation may involve one or more integration application programs.

[0029] The data integration operation may be triggered in the source system. For example, assume that a new inventory item is added by manufacturing. Thus, new inventory location data, such as a new inventory location record corresponding to the new inventory item, is created in the source system. According to certain embodiments, the inventory location record contains information that includes the inventory location name, inventory location description, list of related addresses (shipping, receiving, billing), etc. When an inventory location record is created or modified in the source system, the data integration operation pushes the changes into the target system. In other words, the data integration operation will update the corresponding inventory location record in the target system, if such a record already exists. Otherwise, the data integration operation will create a new record in the target system.

[0030] FIG. 3B is a flow chart that illustrates further aspects of the data integration operation, according to certain embodiments. At block 310, a source application specific adapter listens for synchronize inventory location messages from a source application program in the source system. According to certain embodiments, the source system is configured with a triggering mechanism that sends a message to the integration server when the inventory location information is updated or created

in the source system (back-office). At block 312, a source application specific object (source ASO) that is associated with the message is extracted. At block 314, the source application specific adapter passes the source ASO to a source application transformation business process (SATBP) across an application specific interface (ASI). At block 316, the SATBP maps the source ASO to the inventory location common object model (COM) to create a corresponding inventory location COM instance. At block 318, the inventory location COM instance is passed to the synchronize inventory location integration business process (IBP) via the common service interface (CSI). At block 320, the synchronize inventory location IBP passes the COM instance to the target application transformation business process (TATBP). At block 322, the TATBP converts the inventory location COM instance into the target system's application specific object (target ASO). At block 324, the TATBP invokes the target application specific adapter via the ASI and pushes the target ASO into the target system (front-office). Thus, the inventory location information in the target system is synchronized with that of the source system.

[0031] FIG. 4 to FIG. 16 are data structure diagrams of the inventory common object model. Such an inventory common object model illustrates sample intermediate data structure content produced from corresponding inventory location information in the source format.

[0032] In FIG. 4, the illustrated intermediate data structure 400 is of type listOfInventoryLocation (listOfInvLoc), which may contain any number of inventoryLocation (invLoc) data structures 410. One such illustrated invLoc data

structure 500 is shown in FIG. 5. In FIG. 5, invLoc data structure 500 includes an inventory location identifier 508 (ID), a baseData section 510, a listOfAddress section 512 (list of related addresses for this particular inventory location), a listOfRelatedBusUnit 514 (list of related business units associated with this particular inventory location) and a listOfRelatedInvloc section 516 (list of related inventory locations associated with this particular inventory location). In FIG. 5, invLoc data structure 500 may also include various other information such as various inventory location custom data 518.

[0033] FIG. 6 illustrates the baseData section. In FIG. 6, the baseData section 600 includes identifying information about the inventory location that is obtained from the inventory location information in the first source format, including inventory location Description 602, inventory location Name 604, and inventory location typeCode 606. Examples of inventory location typeCode are "warehouse", "aisle", "shelf", "bin", etc.

[0034] FIG. 7 illustrates the listOfAddress section. In FIG. 7, listOfAddress section 700 includes any number of addresses 702. Addresses 702 are discussed in greater detail herein with reference to FIG. 10.

[0035] FIG. 8 illustrates the listOfRelatedBusUnit section. In FIG. 8, listOfRelatedBusUnit section 800 includes any number of relatedBusUnits 802 (related business units). The relatedBusUnits 802 are discussed in greater detail herein with reference to FIG. 11.

[0036] FIG. 9 illustrates the listOfRelatedInvLoc section. In FIG. 9, listOfRelatedInvLoc section 900 includes any number of relatedInvLoc 902 (related inventory locations). The relatedInvLoc 902 is discussed in greater detail herein with reference to FIG. 12.

[0037] In FIG. 10, address section 1000 includes an common identifier 1008 (ID 1008) for the address, an address baseData section 1010, a dataCleansingData section 1012, and an address relationshipData 1014. In FIG. 10, listOfRelatedInvLoc section 1000 may also include various other information such as various address custom data 1016.

[0038] FIG. 11 illustrates the relatedBusUnit section. In FIG. 11, relatedBusUnit section 1100 includes a business unit identifier 1102 (ID 1102).

[0039] FIG. 12 illustrates the relatedInvLoc section. In FIG. 12, relatedInvLoc section 1200 includes a related inventory location identifier 1202 (ID 1202), and a relatedTypeCode 1204 (related inventory location type code). Examples of related inventory location type codes are "sub level", "fulfill", "replenish", etc.

[0040] FIG. 13 illustrates the dataCleansingData section. In FIG. 13, dataCleansingData section 1300 includes a disableCleansingFlag 1302. Such a flag indicates whether data cleansing should be disabled.

[0041] In FIG. 14, relationshipData section 1400 includes endDate 1402, occupancyTypeCode 1404, startDate 1406, typeCode 1408, and listOfRole 1410. The endDate 1402 is the effective end date for this particular address. Examples of occupancyTypeCode 1404 are "rent", and "own". The startDate 1406 is the

effective start date for this particular address. The typeCode 1408 contains information on the type of address. Examples of typeCode 1408 include "home", "business", "office", "former", "current", etc.

[0042] In FIG. 15, the listOfRole 1500 section (list of address roles) includes address role 1502. In FIG. 16, the address role 1600 section includes an address typeCode 1602 (an address role type). Examples of address role types inlcude "Bill To", "Ship To", etc.

[0043] It will be appreciated by those skilled in the art that the above-described facility may be straightforwardly adapted or extended in various ways. For example, the facility may be used to transform various other kinds of inventory location information, and may be used to transform inventory location information between a variety of other formats.

[0044] In the foregoing specification, embodiments of the invention have been described with reference to numerous specific details that may vary from implementation to implementation. Thus, the sole and exclusive indicator of what is the invention, and is intended by the applicants to be the invention, is the set of claims that issue from this application, in the specific form in which such claims issue, including any subsequent correction. Any express definitions set forth herein for terms contained in such claims shall govern the meaning of such terms as used in the claims. Hence, no limitation, element, property, feature, advantage or attribute that is not expressly recited in a claim should limit the scope of such claim

in any way. The specification and drawings are, accordingly, to be regarded in an illustrative rather than a restrictive sense.